



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/010,704	11/13/2001	McDonald Robinson	Lawrence 712	8430

7590 06/04/2003
Robert Moll
1173 St. Charles Court
Los Altos, CA 94024

EXAMINER

KIELIN, ERIK J

ART UNIT	PAPER NUMBER
----------	--------------

2813

DATE MAILED: 06/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Applicati n N .

10/010,704

Applicant(s)

ROBINSON ET AL.

Examiner

Erik Kielin

Art Unit

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 March 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 49-73 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 49-73 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1, 49-53 and 61-67, and 68, 69, 72, and 73 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Each of the independent claims 1, 68, and 69 recites the limitation “the epitaxial layers” and or “adjacent epitaxial layers.” There is insufficient antecedent basis for this limitation in the claim. Applicant is also reminded of the enablement problem in growing epitaxial layers with carbon at certain higher carbon concentrations as indicated in the parent application 08/336,949.

Independent claims 61, 72, and 73 recite the limitation “one or more layers adjacent to the Si-Ge-C layer...” in lines 6-7 of each claim. This limitation is unclear because if it refers to the grown layers of the first step beginning in line 3, or if these are other layers which the claim is introducing for the first time for which no antecedent exists.

The remaining claims are rejected for depending from the above rejected claims.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an

international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 68 and 69 are rejected under 35 U.S.C. 102(e) as being anticipated by US

5,357,899 (**Bassous et al.**).

Bassous discloses growing one or more epitaxial layers on a silicon crystal substrate (col. 5, lines 55-56), at least one of which is a Si-Ge-C layer, wherein the carbon of the Si-Ge-C layer is an amount sufficient to exhibit etch selectivity with respect to the single crystal silicon substrate and/or one or more of the epitaxial layers adjacent the Si-Ge-C layer (col. 3, lines 1-20); and etching the Si-Ge-C layer with a liquid etchant, and the single crystal silicon substrate and/or one or more of the epitaxial layers adjacent the Si-Ge-C layer (col. 2, lines 54-66; col. 5, lines 55-65), wherein the Si-Ge-C layer etches slower than the one or more adjacent epitaxial layers.

Note that since the adjacent epitaxial layers are not being etched at all, the etch rate is zero and is therefore etching slower. Moreover, as presently written, there exists no requirement in these claims for the epitaxial layer to be etched at all, given the “and/or” phraseology. Accordingly, as long as the substrate is being etched at a different rate than the Si-Ge-C, this limitation is still met, regardless of the relative etch rate of a layer which is not required to be etched. This rejection may be overcome by making a positive statement requiring etching of the one or more adjacent epitaxial layers.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2813

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 49-53 and 54-60 and 61-67, and 70-72 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,357,899 (**Bassous et al.**) in view of the article **Tong et al.** "Etch-stop layers in silicon produced by ion implantation of electrically inactive impurities" in Proceedings of the Fifth International Symposium on Silicon-on-Insulator Technology and Devices, May 1992, pp. 384-402.

Regarding claims 1, 54, 61, and 70-72, **Bassous** discloses growing one or more epitaxial layers on a silicon crystal substrate (col. 5, lines 55-56), at least one of which is a Si-Ge-C layer, wherein the carbon of the Si-Ge-C layer is an amount sufficient to exhibit etch selectivity with respect to the single crystal silicon substrate and/or one or more of the epitaxial layers adjacent the Si-Ge-C layer (col. 3, lines 1-20); and etching the Si-Ge-C layer with a liquid etchant, and the single crystal silicon substrate and/or one or more of the epitaxial layers adjacent the Si-Ge-C layer (col. 2, lines 54-66; col. 5, lines 55-65).

Regarding claims 49, 55, 62, and further regarding claims 70 and 72, the Si-Ge-C layer etches slower than the one or more adjacent epitaxial layers. Note that since the adjacent epitaxial layers are not being etched at all, the etch rate is zero and is therefore etching slower than the Si-Ge-C layer. Moreover, as presently written, there exists no requirement in these claims for the epitaxial layer to be etched at all, given the "and/or" phraseology. Accordingly, as long as the substrate is being etched at a different rate than the Si-Ge-C, this limitation is still met, regardless of the relative etch rate of a layer which is not required to be etched. This

Art Unit: 2813

rejection may be overcome by making a positive statement requiring etching of the one or more adjacent epitaxial layers.

Regarding claims 50, 56, and 63 the Si-Ge-C layer 14 etches slower than the single crystal silicon substrate 10 in Figure 1C.

Regarding claims 51, 57, 64 and further regarding claims 71 and 73, as presently written, there exists no requirement in these claims for the epitaxial layer to be etched at all, given the "and/or" phraseology. Accordingly, as long as the substrate is being etched at a different rate than the Si-Ge-C, this limitation is still met, regardless of the relative etch rate of a layer which is not required to be etched. This rejection may be overcome by making a positive statement requiring etching of the one or more adjacent epitaxial layers.

Regarding claim 52, 58, and 65, the Si-Ge-C layer 12 etches faster than the single crystal substrate 10 in Figure 1B.

Regarding claims 53, 60, and 67, the etching includes applying KOH (col. 5, lines 55-65).

Regarding claims 59 and 66, the single crystal substrate is made of silicon (col. 5, lines 60-5).

Bassous does not teach the amount of carbon present in the etch stop layer.

Tong teaches the Si-C, Si-Ge, and Si-Ge-C etch stop layers relative to single crystal silicon using a liquid etchant that may be an amount of 5% and 10% carbon. (See Abstract, Introduction, and pp. 397-399.)

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use 1 to 5 % or 1 to 10% carbon, as taught by **Tong**, in the Si-Ge-C etch stop layer of **Bassous** because **Bassous** only indicates that the amount of carbon ensure the etch selectivity relative to

the single crystal silicon substrate to form the membrane by etching such that one of ordinary skill would be motivated to determine the amount required to give such etch selectivity, such as that amount taught in **Tong**. Moreover, given that **Bassous** requires etch selectivity of the etch stop layer (i.e. the membrane being formed 14 or the mask 12) relative to single crystal silicon, it would be a matter of routine optimization to determine the amount of carbon required. Given the disclosure of **Tong**, very little experimentation would be required, since **Tong** teaches amounts of carbon which gives etch selectivity between various etch stop materials and single crystal silicon using a liquid etchant.

Double Patenting

7. Claims 1 and 49-73 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-6 of U.S. Patent No. 5,906,708. Although the conflicting claims are not identical, they are not patentably distinct from each other because each claims the use of Si-Ge-C as an etch stop relative to single crystal silicon substrate or adjacent epitaxial layers using a liquid etchant of KOH and wherein the carbon content in the etch stop layer is 1-5% or greater than 2% which makes the range 1-10% obvious.

Response to Arguments

8. Applicant's arguments with respect to all previously rejected claims have been considered but are moot in view of the new ground(s) of rejection.


Conclusion

This action is made non-final to given Applicant the opportunity to respond to the new grounds of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erik Kielin whose telephone number is 703-306-5980. The examiner can normally be reached on 9:00 - 19:30 on Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr., can be reached at 703-308-4940. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.


Erik Kielin
May 30, 2003